

An Introduction to the Study of Indian Spiders

BY

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(*With a text-figure*)

INTRODUCTION

It is a pity that owing to ignorance man fears many harmless creatures and neglects their study. One such neglected group of animals is the spider. From the earliest times man has had an aversion for spiders. The conception that spiders are highly poisonous, noxious and ugly is purely prejudice. Scientists have proved that but for a few exceptions, spiders are generally harmless to man. Apart from the question of poison, acquaintance with spiders reveals that they form as fascinating a group as birds or butterflies. 'Among the wonders of Natural History few things are more remarkable than is the multitude of these small many-legged animals, often of beautiful structure, striking habits, and complex life-histories, yet seldom obtruding themselves upon our notice.' Their external morphological characters, their protective adaptations and coloration, their habits—all present such a range of complexity and variety that they really form engrossing subjects for study.

Consequent upon the general dislike for spiders many species of spiders in this country still remain unnamed. Regarding the ecology of Indian spiders we have but a few notes. There is therefore much scope in this field and in a tropical country like India, rich in all kinds of fauna and flora, there can never be any shortage of specimens. The systematist with the assistance of reference books and a microscope can with some trouble identify and draw up a list of all the available species; but his chief difficulty lies in the fact that he has few named collections of species for comparison. Further in order to fully appreciate the economy of nature, the ecology of spiders should be studied more enthusiastically.

The province of this paper is primarily to recommend spider collection for those who are interested in field natural history. The aim is to describe the external characters, habits, and habitat of the common spiders met with in this country, to indicate the localities where the different genera abound, to suggest some methods of capturing them and finally

to sort them out and preserve them. This work is not intended for advanced systematists but for providing a guide to budding arachnologists.

EXTERNAL MORPHOLOGY OF SPIDERS

A short account of the external morphology of spiders and the chief characteristics of the more common families are given below.

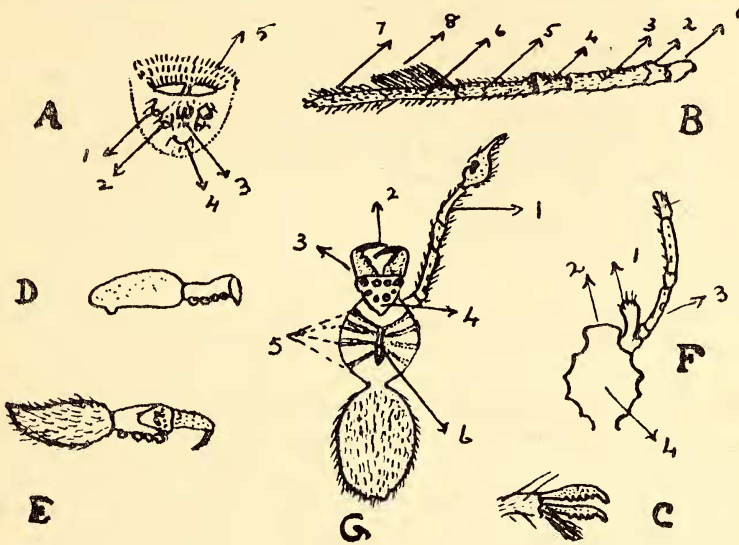
Spiders form a distinct Order Araneae under the Class Arachnida. The body of a spider can be easily distinguished by the presence of a constriction separating the anterior *cephalothorax* from the posterior *abdomen*. On the upper surface of the cephalothorax, near the middle region, a depression is noticeable termed *median fovea* and radiating from this towards the sides are certain lines called the *radial striae*. The head or the *cephalic region* or *caput* forms the anteriormost part and is generally more elevated than the thorax. The caput normally bears eight eyes (in some cases 6 and in a few cases 4). The eyes are arranged in two rows an anterior and a posterior, of two *laterals* and two *medians*. The row may be straight or curved with convexity backward (*procurved*) or convexity forward (*recurved*). The four median eyes together are called the *median quadrangle*. The arrangement and disposition of the eyes are of distinct taxonomical value. The ventral side of the cephalothorax is protected by a plate called the *plastron* or *sternum* usually notched at either side for the reception of the legs which are eight in number. The legs are seven-jointed, consisting of a *coxa*, *trochanter*, *femur*, *patella*, *tibia*, *metatarsus* and *tarsus* ending in a bunch of hairs the *ungual tuft* and in two or three claws. If three claws are present the unguis is generally absent. In some species which have a spinning plate or *cribellum* the metatarsus, especially of the 4th pair of legs, possesses a comb-shaped set of hairs called the *calamistrum*.

The other appendages of the cephalothorax are the *chelicerae* and the *pedipalps*. The chelicerae or the mandibles consist of two joints : (1) the basal segment or *paturon* articulated immediately below the *clypeus* (the anterior edge of the head region), and (2) the distal joint, the *fang* or the *unguis* which folds against the lower side of the paturon along a groove which is toothed. The paturon contains a poison gland.

The pedipalps are six-jointed and in general shape and architecture resemble a dwarf leg minus the metatarsus. The coxa is usually furnished with a process, the *maxilla*. In the males, however, the tarsus of the pedipalp develop into a remarkable copulatory apparatus called the *palpal organ* which presents different designs in different species and is of great systematic importance.

The abdomen differs remarkably in shape in the different groups of spiders although generally it is oval, globular or cylindrical. The integument that covers the abdomen is generally smooth and flexible but

in some cases thickened and drawn into spines or tubercles. On the ventral side of the abdomen are the openings of the respiratory, alimentary and genital systems and the *spinnerets*. The *spinning mamillae* or the



A. Ventral side of the posterior end of a Dictynid Spider: 1. Anterior spinnerets; 2. Posterior spinnerets; 3. Median spinnerets; 4. Anal papilla; 5. Cribellum.

B. 4th leg of a Dictynid Spider: 1. Coxa; 2. Trochanter; 3. Femur; 4. Patella; 5. Tibia; 6. Meta-tarsus; 7. Tarsus; 8. Calamistrum.

C. Terminal portion of a spider's leg showing 2 claws and unguis tuft.

D. Profile of an Arachnomorphic spider showing horizontal articulation of the paturon with the cephalothorax.

E. Profile of a Mygalomorphie spider showing vertical articulation of the paturon with the cephalothorax.

F. Ventral side of the cephalothorax of a spider: 1. Maxilla; 2. Clypeus; 3. Palp; 4. Sternum.

G. Dorsal side of the cephalothorax of a spider: 1. Palpal organ of a male; 2. Unguis; 3. Paturon; 4. Caput showing eyes; 5. Radial striae; 6. Median fovea.

spinnerets are normally six in number, two superior, two median and two inferior. The number, however, shows reduction in some families. The spinnerets and the nature of the vulva in females are also of taxonomical value. Those spiders having a calamistrum possess in addition to the six spinnerets an extra spinning organ in the form of a double sieve plate, the cribellum, already referred to.

There is marked sexual dimorphism in spiders, the females being larger than the males. The female lays a large number of eggs all enclosed in a cocoon. The cocoons of different species differ widely in shape, size, and colour. The eggs hatch and give rise to spiderlings. There is no metamorphosis as in the case of insects.

Spiders are cosmopolitan. No part of the world is without a spider population. Spiders as a Class occur in all climes and under all cir-

cumstances. Exposed to bright sunshine, hunting on the open ground, concealed in dark crevices and holes of trees, adventurously jumping after prey along walls and fences, silently sitting confined to webs stretched along tree branches, under stones and decaying rubbish, and in the corners of shelves or inside less frequently handled office box files. For the far and wide distribution of spiders their habit of dispersal by the 'rope-trick' or 'gossamer' must be mainly responsible. Apart from this the wonderful adaptability of these creatures must be another reason. In the words of Savory 'their distribution is much more nearly that of a creature able to fly than that of a terrestrial animal, as a spider must properly be considered'.

CLASSIFICATION AND DISTINCTIVE FEATURES OF THE COMMON FAMILIES

Spiders are conveniently divided into two groups the Mygalomorphae and the Arachnomorphae. In Mygalomorphic spiders the paturon is articulated with the cephalothorax in a vertical plane, the unguis closing backwards. In Arachnomorphic spiders the articulation of the paturon with the cephalothorax is in the horizontal plane and fang closes inwards.

Under each of these groups there are a number of families.

MYGALOMORPHAE

Most of the members are medium, and large-sized spiders of dull brown or black colour living on the ground under stones or in specialized burrows.

A. *Spiders with coxa of pedipalp having a large maxillary process and six spinnerets*

Family *A t y p i d a e*. The anal tubercle well removed from the posterior spinnerets. Chelicerae without rastellum. Strongly built spiders with smooth integuments. Legs stout but with weak spines and three claws. They live in burrows on the ground.

B. *Coxa of pedipalp without maxillary process and spinnerets limited to four*

Family *C t e n i z i d a e*. Mandible provided with rastellum. Posterior mamillae short or moderately long, anterior ones situated close together. Tarsus without unguis tuft but with three claws. Eyes form a compact group on an eminence. They live in silk lined burrows under stones. Some of them are trap-door spiders.

Family *Dipluridae*. Differs from the above in having no rastellum. Legs with three claws. Posterior spinnerets long and the anterior ones situated wide apart. Medium-sized spiders without burrows or holes but closely woven webs as residences.

Family *Barychelidae*. Medium-sized spiders with mandibular rastellum. Tarsus with unguis and two claws. Spinnerets four or two in number and the extreme segments of the posterior spinnerets very short. They are all burrowing forms.

Family *Theraphosidae*. Medium or large-sized spiders differing from the previous family in the absence of the mandibular rastellum and in having the extreme segments of the posterior spinnerets long and slender. The body is hairy, the claws and tarsi having a bifid appearance. The eyes are set on a distinct tubercle. They are nocturnal in habit living under stones or holes in trees where they weave a slight web.

ARACHNOMORPHAE

A. *Spiders with cribellum and calamistrum*

Family *Filistidae*. Ocular group compact. Palpal organ of male simple. Legs normal. Abdomen with short spinnerets: anterior pair thick and separated from others. Medium-sized spiders found under stones, bark of trees, dry leaves. Webs of close texture of an irregular tubular nature.

Family *Urocteidae*. Ocular group compact. Carapace rounded in front and on sides and emarginate behind. Mouth parts weak. Legs short and strong and nearly of equal length. Tarsus with three claws. Abdomen large and depressed, truncate in front and oval behind. Anterior spinnerets short, separated by a colulus. Posterior spinnerets long and jointed. Anal papilla large and hairy. Small spiders spinning slight webs under stones or in holes of walls.

Family *Eresidae*. The four median eyes form a small quadrangle; anterior laterals on the sides of the head; posterior laterals far removed from the rest of the eyes and situated high up on the posterior portion of the head. Cephalic region of the carapace broad and elevated. Clypeus low. Mandibles flattish in front. Maxillae inclined obliquely inwards. Fang groove weakly toothed. Legs short, strong and thick, three clawed and weakly spined. Abdomen oval, spinnerets with cribellum. Medium-sized spiders. Webs irregular and sticky. Indian genus *Stegodyphus* of social habits.

Family *Psechridae*. Head moderately elevated. Clypeus high, mandibles short and strong, toothed below. Legs long and slender with unguis tufts and three clawed. The first two pairs much longer than the rest. Abdomen oval or cylindrical. Cribellum large. Fairly large spiders weaving somewhat dome-like webs and hanging within in an inverted position.

Family *Uloboridae*. Eyes often set on tubercle. Cephalothorax elongate. First pair of legs longer than the rest. Tarsus without unguis tufts. Abdomen rounded or oval. Anal papilla long and conically acuminate. Small or medium sized spiders weaving a regular orb-web. Common among rafters of outhouses.

Family *Dictynidae*. Eyes in two straight or slightly curved transverse lines. Cephalothorax oval; head broad and convex. Legs strong and three clawed without unguis tufts. Anal papilla short and semi-circular. Small spiders spinning untidy webs on leaves and twigs. General colour variable.

B. *Spiders without cribellum and calamistrum*

Family *Sicariidae*. Spiders with six eyes. Cephalothorax without median fovea. Palpal organ of male simple. Legs weak, abdomen oval or rounded. Small spiders found on leaves, under stones or in outhouses.

Family *Dysderidae*. Spiders with six eyes. Cephalothorax rather flat. Maxillae long and scopulate. Palpal organ simple. Legs strong; sternum excavated along its border for the reception of legs. Abdomen oval or cylindrical. Indian genus *Ariadna*, common under stones and loose soil.

Family *Palpimanidae*. Small spiders with the first pair of legs enormously developed and thick and usually employed for feeling. Tarsi pedunculate and almost clawless.

Family *Zodariidae*. Small spiders with posterior spinnerets absent or much shorter than the anterior. Tarsi three clawed. Abdomen ornamented with dots or patches.

Family *Hersilliidae*. Eyes normal. Carapace as wide as long, head region round but narrow in front. Thoracic fovea and radial striae well marked. Legs long and spiny with three claws; third pair shorter. Abdomen short and oval with posterior spinnerets long and slender—hunting spiders common on tree trunks and walls.

Family *Pholcidae*. Anterior median eyes small, others large forming a group on either side of the head. Cephalothorax flat and round with fovea well defined. Mandibles untoothed. Legs very thin and long, with spines. Abdomen round oval or sub-cylindrical; spinnerets short and sub-equal. Sedentary spiders weaving untidy webs in corners and ceilings of outhouses.

Family *Theridiidae*. Strikingly resembles the following family but generally small-sized forms with rounded abdomen. Members possess a comb of spines on the tarsus of the fourth pair of legs. Webs are irregular and not perfect orbs.

Family *Argiopidae*. Lateral eyes on the sides of head typically close together away from the median quadrangle. Mandibles strong and toothed but variable in size and shape. Legs show great variation in different genera. Abdomen also highly variable but spinnerets normal and rosette-like behind abdomen. Sedentary spiders spinning geometrical orb-webs.

Family *Thomisidae*. Eyes are normal. Mandibles weak and weakly toothed. Legs strong, 2nd and 3rd pairs shorter. Abdomen prominent, oval, flat, triangular or pentagonal. Generally called 'crab-spiders'.

Family *Lycosidae*. Eyes of posterior row recurved and large; anterior ones usually small, compact, and directed forwards. Mandibles strong and powerfully toothed; pedipalp with short maxillary process. Carapace elevated and narrow in front. Legs strong and spiny, jast pair longer. Abdomen long oval with spinnerets sub-equal. Powerful, hunting, ground spiders.

Family *Sparassidae*. Median eyes form a normal quadrangle. Carapace as wide as long; clypeus low. Tarsal claws armed with teeth. Abdomen sub-oval.

Family *Clubionidae*. Median eyes arranged in a recurved crescent. Carapace flat usually wider than long. Clypeus suppressed; maxillae project forward and not inclined on the labium. Mandibles powerful and toothed. Legs strong and spiny with scopulate tarsi; tarsal claws unarmed. Abdomen oval with anterior spinnerets in contact.

Family *Oxyopidae*. Eyes form a compact sub-circular group; anterior line recurved and posterior procurved. Carapace oval and elevated. Mandibles long and weakly toothed. Legs strong and spiny. Abdomen oval in front and tapering behind.

Family *Attidae*. Anterior median eyes very large ; eyes of posterior line forming a square on the sides of the head. Head region large and raised. Legs strong ; tarsi with unguis and 2 claws. Abdomen oval but sometimes narrow behind. Common jumping spiders.

SOME HINTS TO SPIDER COLLECTORS

Although spiders are ubiquitous there are some difficulties for the collector to detect and catch them mainly because of their habits, diversity of form, colour and behaviour, calculated to deceive and surprise. There are spiders nearly as big as a small bird (*Nephila maculata*) and those as small as mites (Oonopids) ; spiders gorgeously coloured as well as insignificantly dull ; sedentary spiders with magnificent webs and also vagabonds without residence ; social spiders and cannibalistic ones ; skilful hunters (Lycosids), jumpers (Attids), excellent mimics, expert architects and specialised swimmers. The different species of spiders with their protective adaptations evade their enemies so well that unless the collector is astute and enthusiastic it is difficult to catch them.

The equipment necessary for the collection of spiders is simple. A cylindrical glass jar (2 to 2½ in. diameter and 6 in. high) containing some spirit and provided with a proper lid, a pair of forceps with flat ends, a muslin kerchief and a small net like the one usually employed by butterfly collectors, are enough for spider collection.

Sedentary spiders resting on walls, leaf blades, tree-trunks or in the webs can be caught in the jar by holding it open beneath them and by tapping the spiders into it with the lid. Running and vagabond species like lycosids and attids can be caught by throwing a kerchief over them and carefully holding them with the hand in the folds, transfer them into the jar. Small spiders residing among grass and herbage can be caught in the net by sweeping it sideways. Shake a tree branch vigorously, and spiders living there will be thrown off and will attempt to climb up by their threads when it is easy to tap them into the jar. In handling spiders the use of forceps must as far as possible be avoided as the brittle limbs give way easily.

GROUPING AND IDENTIFICATION

Spiders being collected in spirit, are already killed and the collector has only to sort them out. With the assistance of literature on the subject and with an ordinary lens, it would not be very difficult to group the collection into the principal families. Put the specimens into separate tubes (flat-bottomed) with labels containing information regarding date and place of collection and the collector's name. Close the mouths of the tubes with tissue paper. Immerse all the tubes in a big Kilner-jar con-

taining dilute spirit or a mixture of glycerine and formalin. Spirit is generally preferred as formalin hardens the specimens. Before closing the Kilner-jar, see that all spider tubes are well under the spirit level.

For identification of the specimens and for placing them under proper genera and species, the student will have to consult some standard systematic reference book such as the FAUNA volume on Arachnida by Pocock. It should, however, be borne in mind that since this book was published certain families have been revised and supplemented by other authors. Moreover, many families are altogether omitted in this work and the species dealt with under the different families are limited, being possibly based on the actual specimens examined by Pocock during his study. Therefore for a comprehensive study this book is inadequate. There is still much work to be done on Indian attids, theridiids and several other families. Dr. F. H. Gravely, late Superintendent of the Government Museum, Madras, contributed several papers on Indian lycosids, ctenids, sparassids, selenopids and clubionids. These papers appeared in the *Records of the Indian Museum*, Calcutta, during the years 1921 and 1924. Other contributors on Indian spiders are Rae Sheriffs, Dayal, and more recently, Tikader. Literature on extralimital species should also be consulted for grouping Indian species. Cecil Warburton's chapter on spiders in the Cambridge Natural History Series, Savory's BIOLOGY OF SPIDERS, Thorelli's SPIDERS OF BURMA, Ellis's SPIDERLAND, Comstock's COMITY OF SPIDERS etc. are books which should be read by every spider collector.

In order to bring the list of spiders occurring in this vast country up-to-date, more workers are required and it is believed that the spider enthusiasts will receive necessary assistance and encouragement from our Universities, Natural History Museums and the Zoological Survey of India.

(to be continued)